DOCUMENT RESUME

ED 054 201 TM 000 765

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TITLE	New Film Tests of Visual Perception.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
PUB DATE	Feb 71
GRANT	OEG-0-9-242063-0772(032)
NOTE	9p.; Paper presented at the Annual Meeting of the American Educational Research Association, New York, New York, February 1971
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	Abstract Reasoning, *Children, Diagnostic Tests, Dyslexia, Grade 1, Grade 2, Individual Tests, *Instructional Films, Memory, *Perception Tests, Perceptual Development, Test Construction, Testing, Test Reliability, Test Validity, Time Perspective, Visual Learning, *Visual Measures, *Visual Perception

ABSTRACT

The rationale and development of a new series of motion picture tests of perceptual abilities of young children are described, and preliminary data regarding their reliability and validity are presented. The data suggests that the film tests are promising new perceptual measurement instruments. (MS)

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New Film Tests of Visual Perception

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Purpose

The purpose of this paper is to describe the rationale and development of a new series of motion picture tests of perceptual abilities of young children, and to present some preliminary data regarding their reliability and validity.

Background

The work reported in this paper is a direct out growth of the investigations of Gibson (1947). Gibson and his colleagues developed a series of filmed tests measuring aptitudes involved in distance and motion perception and other abilities related to the performance of aircraft crews. Seibert and Snow (1965) used a number of Gibson films together with newly constructed film tests and other measures of cognitive abilities to study the underlying factor structure of visual cognition and memory. These and subsequent studies (Seibert, Reid, and Snow, 1967) identified a cluster of factors which seem to account for a large measure of the performance on a variety of perceptual and cognitive tasks.

While the work reported was carried out with young adults, the approach seems to hold promise for the development of tests useful in diagnosis of children with learning disabilities. In addition to the factor analytic studies, clinical experience with children exhibiting learning disabilities

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The work reported in this paper was supported by USOE grant OEG-0-9-242063-0772 (032)

Paper presented at the American Educational Research Association Convention, February, 1971.

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suggests additional visual tasks potentially useful in diagnostic work with children (Strauss and Kephart, 1955). The statistical and clinical studies describe at least four important perceptual abilities:

1. Visual memory span - The amount of visual information which can be perceived and remembered.
2. Space structure - The ability to perceive and appreciate the arrangements of objects in space.
3. Time-Space translation - The ability to accumulate visual stimuli over a period of time and organize them into meaningful patterns.
4. Form perception - The ability to perceive and recognize visual patterns.

Guided by these general notions and the existing film tests, more than twenty brief "mini-tests" were developed and tried out on first and second grade children. Item analysis of the tests was accomplished using as criterion groups children identified by the Rutgers Drawing Test, Form B (Starr, 1961). The Rutgers Drawing Test is similar to the Bender-Gestalt; perceptual-motor functioning is measured by the child's ability to copy geometric designs. Mini-tests were selected for further development if they discriminated between children in the high and low groups identified by the Rutgers (top vrs bottom 27 percent).

The tests

Ten tests were developed which differ from existing paper and pencil tests of perception by incorporating the phenomena of movement, three dimensional

space and the integration of stimuli occurring through time. Responses are non-verbal for nine of the ten tests. Stimulus material appears on the screen and the child indicates his response by pointing to the appropriate designs or arranging response cards supplied him by the examiner. Each of the ten tests is briefly described below.

1. Spatial Orientation of Objects - Colored blocks are moved by animation and the child replicates the movement with his own set of blocks.

2. Form Identification - A pattern recognition task involving geometric figures.

3. Moving Slot - A design moves behind an open slot so that only a portion is seen at any given time. The child then identifies the design from among a group of four.

4. Figural Memory Span - A visual span task involving from two to five free form figures.

5. Temporal Memory Span I - Common objects (pipe, shoe, pan, etc.) appear on the screen successively. The child must name the objects in their order or appearance.

6. Pathfinder - A moving dot describes an irregular path. The child must identify the path from a group of four.

7. Embedded Figures - A geometric design is exposed briefly on the screen. The child must find the design within a camouflaging figure.

8. Successive Figures - Elements of a figure are shown one at a time. The child must identify the figure formed.

9. Temporal Memory Span II - A visual memory span task with a maximum of six free form designs presented one at a time.

10. Driving Test - A toy truck moves through the intersection of a model village. The child must trace the path of the truck on a photograph of the village rotated 90 degrees from the original observation point.

At the AERA presentation, a 16 mm demonstration film showing two representative items from each of the film tests was presented. This film is available on a loan basis from the author for the cost of postage.

Testing Arrangements

The tests are designed for individual administration. The examiner and the subject are seated at a table facing a screen approximately eight feet in front of them. The subject is on the examiner's right. On the examiner's left is a super eight movie projector (Kodak MFS-8) which is stopped and started by a remote control button in the examiner's hand. The testing materials also include two large three ring note books which contain response plates and other objects used by the subject to indicate his response. The testing room should be dim or semi-dark in order that a distinct image appears on the screen, but not so dark that the subject cannot see clearly the response pages with which he is working.

The tests are given in two forty minute testing sessions of 5 tests each. Somewhat less time is required for children of 10 years and older.

Validity Studies

The tests have been administered to 105 dyslexic children enrolled in a summer residential training center at Berea, Kentucky.[1] The children come mainly from the middle southern states, from upper income homes, of normal or higher intelligence, and about 80% are males. They range in age from 6 to 18.

The scores obtained from the ten film tests were correlated with twenty-three subtest scores from widely used school achievement batteries. These test scores were available from the records maintained by the training center staff. These correlations are presented in Table 1, Correlation Coefficients Among Film Tests and Measures of Intelligence and Achievement. Empty cells

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[1]We gratefully acknowledge the assistance of Dr. Charles Shedd, University of Alabama Medical School, who directs the Berea program.

Table I

Correlation Coefficients Among Film Tests and Measures of Intelligence and Achievement

	Binet	Goodenough	Lorge-Thorndike Verb.	Lorge-Thorndike Non-V.	Iowa Silent Reading	Durrell-Sullivan	Wide Range Vocab.	Reading	California Arith.-Reas.	California Arith.-Fund.	California Arith.-Total	California Lang. Mech.	California Lang. Spelling	California Lang. Total	California Para. Meaning	California Word Meaning	Stanford Ach. Arith.-Reas.	Stanford Ach. Arith.-Comp.	Stanford Ach. Soc. Studies	Stanford Ach. Spelling	Stanford Ach. Speed	Gates Reading Comp.	Gates Reading Vocab.
No. of cases:	105	105	70	70	105	105	105	105	105	105	105	105	105	105	70	70	70	70	70	70	35	35	35
1 Spatial Orientation of Objects				.24													*.45		*.44		*.44		.33
2 Form Identification					*.30	*.32	*.26												*.30	*.29			
3 Moving Slot					.21	*.35	*.32					.19	.18							*.38			
4 Figural Memory Span	*.25		*.40	.27	*.25	*.37	*.36	.21			.21	*.38	*.28	*.33	*.38	*.35	*.37	*.36	*.35				
5 Temporal Memory Span I					*.28	*.44	*.46	*.23			*.36	*.35	*.38	*.35	*.36	*.32	*.35	*.51	*.49	*.55	.39	*.49	
6 Pathfinder				*.31	*.29	*.42	*.40				*.28	.20	*.25	.22		*.35	.27	*.30	*.37			.30	
7 Embedded Figures			*.39	*.33	*.42	*.42	*.34	*.27			*.35	*.29	*.36	*.35	*.34		.23	*.36	*.39	*.44	*.42		
8 Successive Figures				*.34	*.32	*.48	*.44	.19	.22		*.30	*.27	*.32		.22	.27	.28	.28	*.43				
9 Temporal Memory Span II			*.32		*.42	*.39	*.41	*.24			*.34	*.27	*.35	*.34	*.34	.21	.34	*.50	*.43				
10 Driving Test				.33	*.42	*.38	*.35				*.30		.28						*.38	*.36			

* significant beyond the .01 level

in this table represent correlations which did not reach the .05 levels of significance.

Inspection of Table 1 reveals at least three interesting characteristics of the film tests: (1) The tests seem to be relatively independent of intelligence as measured by the Stanford-Binet and the Goodenough. Six of the film tests are significantly correlated with the non-verbal score of the Lorge-Thorndike, but since this measure of intelligence makes use of figure groupings and figure analogies the meaning of the overlap with the film tests is not clear. (2) With the exception of Successive Figures, none of the film tests is associated with arithmetic achievement as measured by the California Achievement Tests. The three visual memory span tests and two measures of time-space translation, however, are significantly related to both arithmetic achievement measures of the Stanford Achievement Battery. (3) A number of significant correlations are evident between the film tests and measures of reading, vocabulary, and language usage. Among the most prominant tests in predicting reading are the three visual memory span tests and Embedded Figures.

In order to compare the dyslexic children with a group of normal children, the film tests were administered to 48 children in grades 1 through 6 enrolled in a school serving middle income groups in Lafayette, Indiana. Only children with Primary Mental Ability total I.Q. scores of 95 or better were included and the children were selected so that 80 percent of the group would be boys.

Stratifying by age level and sex, twenty-four Berea children and twenty-four Lafayette children were drawn randomly to provide the comparison groups.

Each group contained six children at each age level, 8 through 11 years. The data for these groups is presented in Table II, Means and Standard Deviations for Berea and Lafayette.

Inspection of Table II reveals that there are significant differences between the mean scores of the dyslexic group and the normal group for seven of the film tests. Temporal Memory Span II and Embedded Figures exhibit the most marked difference between the two groups.

Reliability

Kunder Richardson Formula 20 reliability coefficients were computed for each test on the scores earned by the 48 elementary school pupils tested in Lafayette. These reliability coefficients are presented below.

Spatial Orientation of Objects	.76
Form Identification	.32
Moving Slot	.40
Figural Memory Span	.50
Temporal Memory Span	.62
Pathfinder	.64
Embedded Figures	.73
Successive Figures	.67
Temporal Memory Span II	.66
Driving Test	.83

Conclusions

The data presented suggest that the film tests are promising new instruments for the measurement of perceptual abilities among children. The reliability coefficients are not yet sufficiently high to warrant the use of these tests for individual diagnostic work. Since the data reported in this paper has been collected, extensive revision of the response forms has been accomplished based on item analysis of the Berea data. The revisions should make the tests somewhat more difficult and should improve both the reliability and the discriminating power of the items. It is hoped that the revised instruments will be useful to investigators working in the areas of developmental psychology, learning disabilities and cross cultural studies.

Table II

Means and Standard Deviations for Berea and Lafayette

	Berea n = 24		Lafayette n = 24		
	X	S.D.	X	S.D.	t
Spatial Orientation of Objects	11.6	2.56	12.7	2.79	1.345*
Form Identification	14.7	1.88	15.8	1.78	2.142*
Moving Slot	12.8	1.26	12.7	1.72	- .184
Figural Memory Span	6.6	1.87	7.5	2.06	1.557*
Temporal Memory Span I	8.0	1.49	8.8	1.76	1.513*
Pathfinder	11.5	3.13	12.2	2.79	.763
Embedded Figures	10.5	3.10	12.6	2.64	2.444*
Successive Figures	9.8	2.91	11.1	3.13	1.430*
Temporal Memory Span II	5.4	2.00	7.3	1.97	3.292*
Driving Test	7.6	3.95	8.5	3.46	.694

* Indicates significance beyond the .01 level

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